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News

Childhood cancer survivors may face shortened lifespan, study reveals

Newer Treatments, Closer Monitoring Should Improve Longevity, Say Researchers

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Boston, MA—Although more children today are surviving cancer than ever before, young patients successfully treated in the 1970s and 80s may live a decade less, on average, than the general population, according to a study from Dana-Farber Cancer Institute and the Harvard School of Public Health.

Depending on the type of cancer, the estimated loss of life expectancy ranges from four years to more than 17 years, the scientists report in the April 6 issue of the *Annals of Internal Medicine*. Causes of the premature deaths include recurrences of the initial cancer, new cancers caused by drug and radiation therapy, and other delayed complications from cancer treatments.

The study, based on a computer model, is the first to estimate the lifetime toll of childhood cancer and the grueling but increasingly successful treatments for diseases such as kidney and bone cancers, leukemia, and brain tumors. About 10,000 children and adolescents are diagnosed with cancer annually, and the five-year survival rate has risen to about 80 percent overall.

Jennifer Yeh, PhD, a research fellow at the Harvard School of Public Health (HSPH) Center for Health Decision Science and first author of the report, said she was surprised when the analysis projected a 10-year average loss of life expectancy. “For a group of patients fortunate enough to have survived their initial cancer, to still have this considerable extra risk is disheartening,” she said.

However, Lisa Diller, MD, clinical director of Pediatric Oncology at Dana-Farber and Children's Hospital Boston, who is the senior author of the paper, said that recent changes in treatments and the increasing use of less-toxic "targeted" therapies may lead to better long-term outcomes in the future.

"The study is based on how children were treated in the 1970s and early 1980s," said Diller, who directs the Perini Family Survivorship Center at Dana-Farber. "It is our hope that when we see data from more recent cohorts of patients, there will be improved life expectancy as a result of some changes that pediatric oncologists have made."

For example, pediatric cancer doctors have been tweaking treatment regimens to minimize harm to normal tissues and organs while assuring that treatments remain effective for cancer control. Radiation beams are being more tightly focused on the cancer, oncologists are avoiding chemotherapy agents that can damage particular organs, and some children are receiving drugs aimed at preventing toxicity to these organs along with their cancer drugs.

Yeh said there is often a "disconnect" when young patients, following successful treatment, switch to a primary care physician for adult care. "Many times the primary care physicians aren't as familiar with the history of the treatments and the higher risks" of serious complications their patients face, she said.

Diller added that because most physicians will see very few patients with a history of childhood cancer, they may not be alert to symptoms that could signal a recurrence or a new cancer. For example, she said, the common complaint of heartburn would normally not be cause for great concern in someone without a prior history of cancer, but in a survivor, it should be investigated as a possible indicator of stomach cancer.

"It is not reasonable to expect a primary care doctor who has one childhood cancer survivor in his or her practice to know about all the prior treatments used and their long-term after-effects," said Diller. "As pediatric oncologists we should be arming the patient transitioning to adult primary care with personalized information about their treatment, and creating a survivorship care plan for them."

The additional risks of illness and death conferred by childhood cancer and its treatments have been studied previously, but findings were not translated into estimated life

expectancy, said the scientists. Their new research drew on data collected in the Childhood Cancer Survivor Study (CCSS) on individuals who were under age 21 when diagnosed with cancer between 1970 and 1986, and who survived at least five years. Those patients have been followed only for 20 to 30 years, Yeh said, so lifetime outcomes aren't yet known.

The HSPH and Harvard scientists and their collaborators used a mathematical simulation model that converted the excess mortality risk estimates from the CCSS into estimated life expectancies for the survivors compared to the general population. Among their projections were these:

- For all types of cancer, life expectancy was decreased by an average of 10.4 years, or 17.1 percent, ranging from 4.0 years (6.0 percent) for kidney cancer survivors to about 17.8 years (28.0 percent) for brain and bone tumor survivors.
- One in four survivors would die from recurrences of the original cancer or from new cancers developing as a result of treatment. One in 20 would die from non-cancer-related causes such as heart and respiratory damage caused by cancer therapy.
- The risks of premature death are highest in the first few decades after diagnosis and treatment, leveling off in later years. "These results suggest that recognition and treatment of illnesses associated with late effects in the first 35 years after therapy for childhood cancer will probably result in improved longevity," the authors wrote in the report.
- Patients treated in the more recent years of the CCSS study fared better than those treated earlier, giving hope that changes in cancer therapies will lead to longer lives.

In 2007, the CCSS began recruiting a new cohort ofchildhood cancer survivors treated between 1987 and 1999. When the results become available, the authors plan to estimate how improved methods of delivering cancer treatment may reduce the impact of cumulative long-term effects on survivor life expectancy.

"This study highlights the potential for comprehensive survivorship care," said Yeh. "We are hopeful that this care, including appropriate screening and greater awareness among primary care physicians, can reduce the mortality risks associated with a history of childhood cancer."

Other authors of the study are Larissa Nekhlyudov, MD, PhD, of Harvard Medical School, Sue J. Goldie, MD, MPH, of HSPH Center for Health Decision Science, and Ann C. Mertens, PhD, of Emory University in Atlanta.

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